

AMATS: Glenn Highway Integrated Corridor Management (ICM) Study

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DRAFT Existing Conditions Report: Part 4 Parallel Routes Analysis

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Abbreviations

DOT&PF	Alaska Department of Transportation and Public Facilities
FHWA	Federal Highway Administration
ICM	Integrated Corridor Management
KE	Kinney Engineering
MOA	Municipality of Anchorage
SRAHNET	Strategic Highway Network

Definition of Terms

Average Annual Daily Traffic (AADT): A measurement of the number of vehicles traveling on a segment of highway each day, averaged over the year.

Controlled Access Freeway: Divided multi-lane highway without direct access to adjacent land uses. Users must utilize ramps to reach adjacent highway facilities with access to the adjacent land uses.

Crash Modification Factor (CMF): Factor associated with a safety treatment. Crashes for the condition without the safety treatment are multiplied by the crash modification factor to determine the number of crashes if the treatment is applied. CMFs are determined using a statistical analysis of sites with and without the treatment.

Integrated Corridor Management (ICM): Management of a transportation corridor to optimize use of available infrastructure by directing travelers to underutilized capacity (for example, shifting travel times, routes, or mode). Multijurisdictional partner agencies manage ICM corridors as collaborative, multimodal systems.

Interchange: Set of ramps and intersections used to allow traffic to travel to and from a controlled access freeway facility.

Level of Service (LOS): Performance measure concept used to quantify the operational performance of a facility and present the information to users and operating agencies. The actual performance measure used varies by the type of facility; however, all use a scale of A (best conditions for individual users) to F (worst conditions). Often, LOS C or D in the most congested hours of the day will provide the optimal societal benefits for the required construction and maintenance costs.

Peak Hour Factor (PHF): Measure of traffic variability over an hour period calculated by dividing the hourly flowrate by the peak 15-minute flowrate. PHF values can vary from 0.25 (all traffic for the hour arrives in the same 15-minute period) to 1.00 (traffic is spread evenly throughout the hour).

Critical Accident Rate (CAR): Statistical measure used in crash rate analysis to determine statistical significance. If the crash rate of the location in question is above the upper control limit for that location, the crash rate is above the average crash rate for similar facilities to a statistically significant level.

Volume to Capacity Ratio (v/c): Measure of how much of the available capacity of a facility is being used, calculated by dividing the demand volume by the capacity of a facility. Values of 0.85 or less indicate adequate capacity to serve the demand volume. When v/c is greater than 0.85, drivers begin to feel uncomfortably crowded.

1 Introduction

The Alaska Department of Transportation and Public Facilities (DOT&PF) has retained Kinney Engineering, LLC (KE) to prepare this Existing Conditions Report for the Glenn Highway Integrated Corridor Management Study (ICM).

The Glenn Highway stretches 179 miles from Anchorage to Glennallen and provides the only northern access to and exit from Anchorage. A major thoroughfare for freight, commuter, and tourist travel to and from the Anchorage region, the Glenn Highway is classified as an Interstate by the Federal Highway Administration (FHWA) and is identified as part of the Strategic Highway Network (STRAHNET), a network of highways which are considered critical to US strategic domestic operations. As depicted in Figure 1, the study corridor is located in the Municipality of Anchorage (MOA) and extends from MPT 0, at Airport Heights/Mountain View Drive to MPT 29.1, which marks the end of the MOA and the beginning of the Matanuska-Susitna Borough (MSB).

The study corridor experiences non-recurring congestion due to unplanned events (such as crashes) and planned events (such as road construction), that require lane closures and have a significant negative impact on the movement of people and goods. Numerous agencies and entities have studied methods to increase resiliency to non-recurring events along the study corridor and some improvements have been implemented. However, since delays on the Glenn Highway due to these events are very disruptive and are associated with significant time, safety and monetary costs, a more holistic approach, involving multiple local stakeholder groups, is needed to manage the corridor. The purpose of this ICM Study is to identify methods to improve the efficiency of the movement of people and goods along the study corridor through institutional collaboration and proactive integration of existing and future infrastructure.

The study area includes 29.1 miles of Interstate freeway with grade separated interchanges. At the southern-most end of the study area, the freeway begins at the signalized intersection of Airport Heights Drive/Mountain View Drive. From Airport Heights Drive (MP 0) to the Eagle River Loop/Hiland Road exit (near MP 12), there are 3 travel lanes in each direction. North of the Eagle River Loop/Hiland Road interchange, the northbound lanes were recently reconstructed, and the 3-lane cross section now continues northbound to the Eagle River/Artillery Road exit. Meanwhile, there are only two southbound lanes between Eagle River/Hiland Road and Eagle River/Artillery Road. There are 2 travel lanes in each direction from the Eagle River/Artillery Road interchange to the Knik River Bridge (the northern-most end of the study area). North of the study area, the Glenn Highway continues into the Matanuska-Susitna Borough. Near MP 35, there is a major interchange with the Parks Highway

and the Glenn Highway continues north through Palmer until it connects with the Richardson Highway at around MP 189.

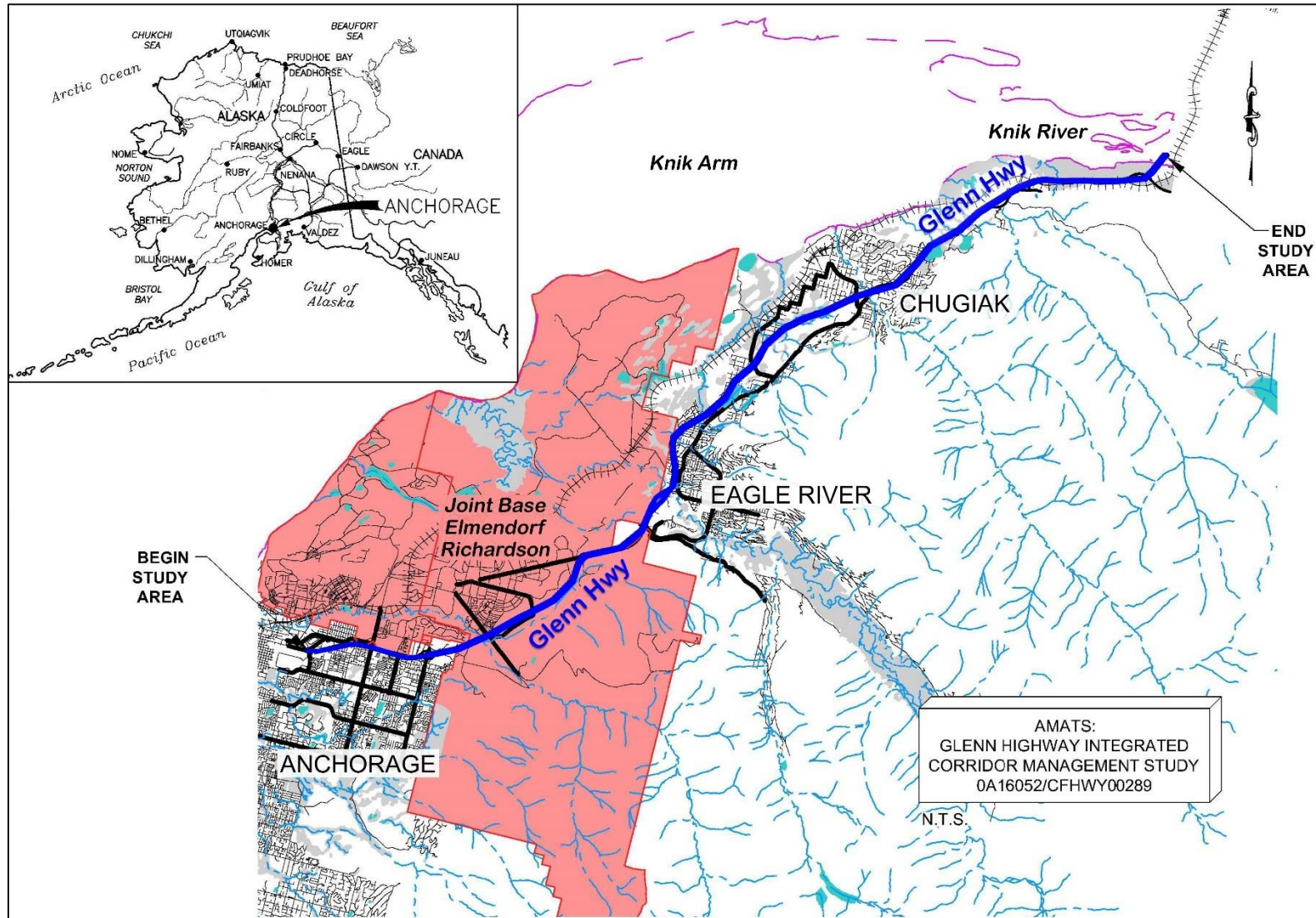


Figure 1: Vicinity Map

2 Excess Capacity on Parallel Routes

Because there are no interstate facilities parallel to the Glenn Highway that can route traffic between Anchorage and areas north of Anchorage, alternative routing for detours relies upon usage of the arterial, collector, and even local road network in the area surrounding the Glenn Highway. This network provides the only alternative routing during major closures of the Glenn Highway. Unfortunately, the road network in many areas of the Glenn Highway study corridor is limited.

To categorize the parallel routes, the Glenn Highway was divided into the following six segments:

- *Segment 1* Airport Heights Drive to Muldoon Road (MP 0 to 4)
- *Segment 2*: Muldoon Road to Eagle River Loop/Hiland Road (MP 4 to 12)
- *Segment 3*: Eagle River Loop/Hiland Road to South Birchwood Loop (MP 12 to 16)
- *Segment 4*: South Birchwood Loop to Chugiak/North Birchwood Loop (MP 16 to 21)
- *Segment 5*: Chugiak/North Birchwood Loop to Mirror Lake (MP 21 to 23)
- *Segment 6*: Mirror Lake to the Knik River Bridge (MP 23 to 30)

To obtain a high-level estimate of how well the existing network could absorb additional traffic in the event of major closures on the Glenn Highway, each segment was analyzed. Existing peak hour volumes (AM and PM) were estimated for both the Glenn Highway and the alternate routes from. Existing AADTs were collected from the DOT *Central Region Annual Traffic Volume Reports* for 2013. Design hour volumes were estimated as 9% in the AM peak and 10% in the PM peak, based on hourly volume data provided by DOT&PF for 19 days at the scale house in 2013. Capacity on the alternate routes was approximated using the AMATs model base year of 2013. Finally, excess available capacity on the alternate routes was calculated by determining the difference between capacity (from the AMATs model) and demand (estimated peak hour volumes) over the entire segment. The excess available capacity represents the extra volume (in addition to usual traffic) that the alternate routes could handle in the event of a major closure on the Glenn Highway.

2.1 Segment 1 – Airport Heights Drive to Muldoon Road (MP 0 to 4)

This segment of the corridor runs mostly east-west and falls within the urban core of the Anchorage Bowl. On the south side of the Glenn Highway, there is a system of parallel arterial roadways at 1-mile spacing. On the north side of the Glenn Highway however, there are limited detour options due to Joint Base Elmendorf-Richardson (JBER). Figure 2 shows the network grid in this segment of the corridor.

Figure 3 and Figure 4 show the excess network capacity analysis for this segment of the Glenn Highway in the AM and PM peak periods, respectively. The segment from Bragaw Street to Boniface Parkway has the least excess capacity during both peak periods. Note that only about ½ of the Glenn Highway traffic could be accommodated on the arterial network in the PM peak hour.

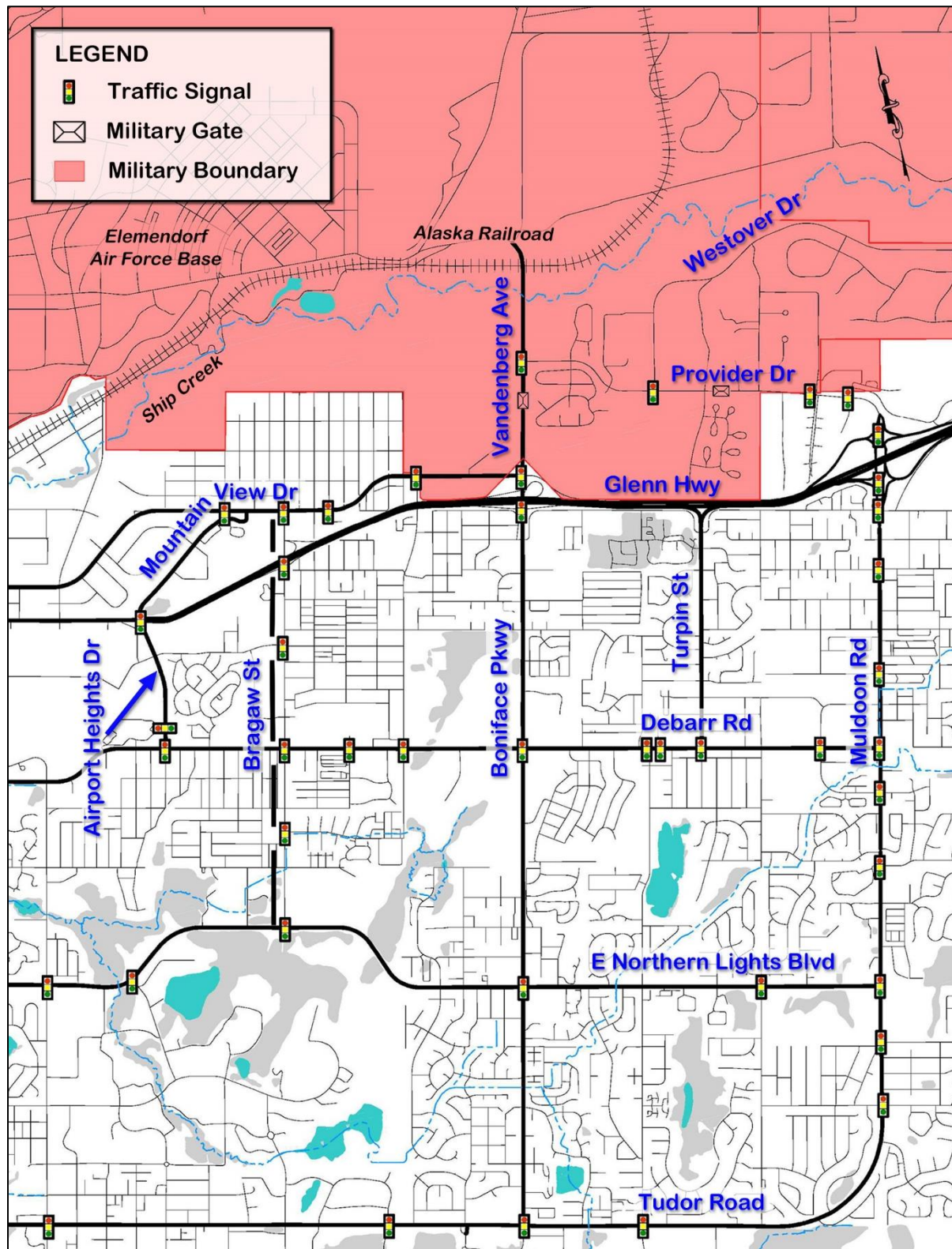


Figure 2: Segment 1 – Airport Heights Drive to Muldoon Road (MP 0 to 4)



Figure 3: Available Excess Capacity on Segment 1 (MP 0 to 4), AM Peak Hour



Figure 4: Available Excess Capacity on Segment 1 (MP 0 to 4), PM Peak Hour

2.2 Segment 2 – Muldoon Road to E Eagle River Loop/Hiland Road (MP 4 to 12)

This segment of the corridor runs northeast-southwest through JBER. As such, only limited portions of the parallel network are available for general traffic. Figure 5 shows the network grid in this segment of the corridor.

Figure 6 and Figure 7 show the excess network capacity analysis for this segment of the Glenn Highway in the AM and PM peak periods, respectively. The only available parallel route for this segment is between Arctic Valley and D Street, which can only accommodate about 15% of the Glenn Highway traffic in the peak periods.

Note that DOT&PF installed crossover points for this portion of the highway that would allow traffic to cross over the median and travel contraflow. Contraflow plans for this section of highway that were developed in 2003 can be found in the Part 2 Appendix C files. Under the contraflow plan, the northbound traffic uses the frontage road from the Arctic Valley Road exit. The frontage road is converted to northbound only (two northbound lanes), and the restricted access road is opened to traffic up to the scale house, where a crossover has been built to return northbound traffic to the highway.

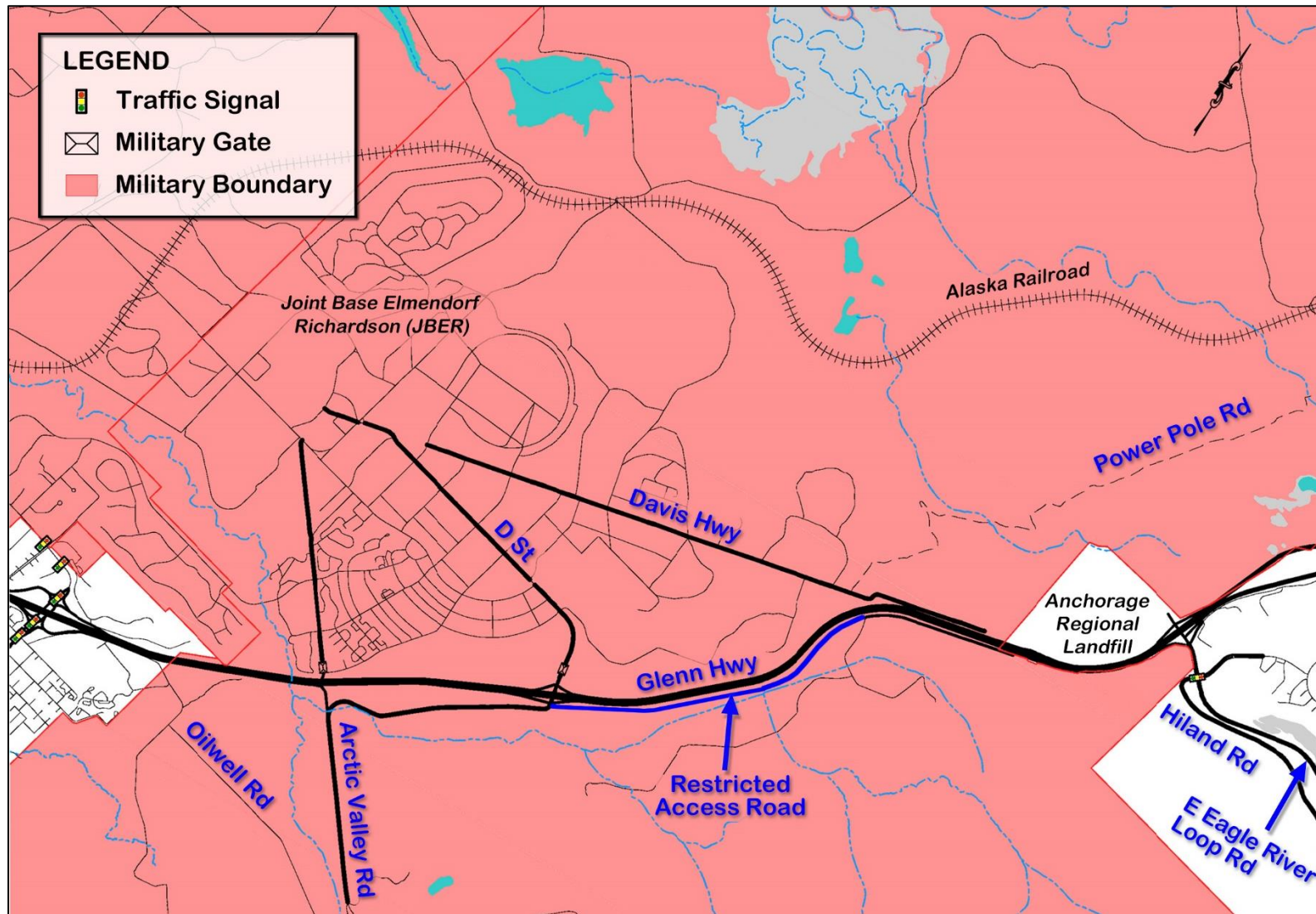


Figure 5: Muldoon Road to Eagle River Loop/Hiland Road (MP 4 to 12)

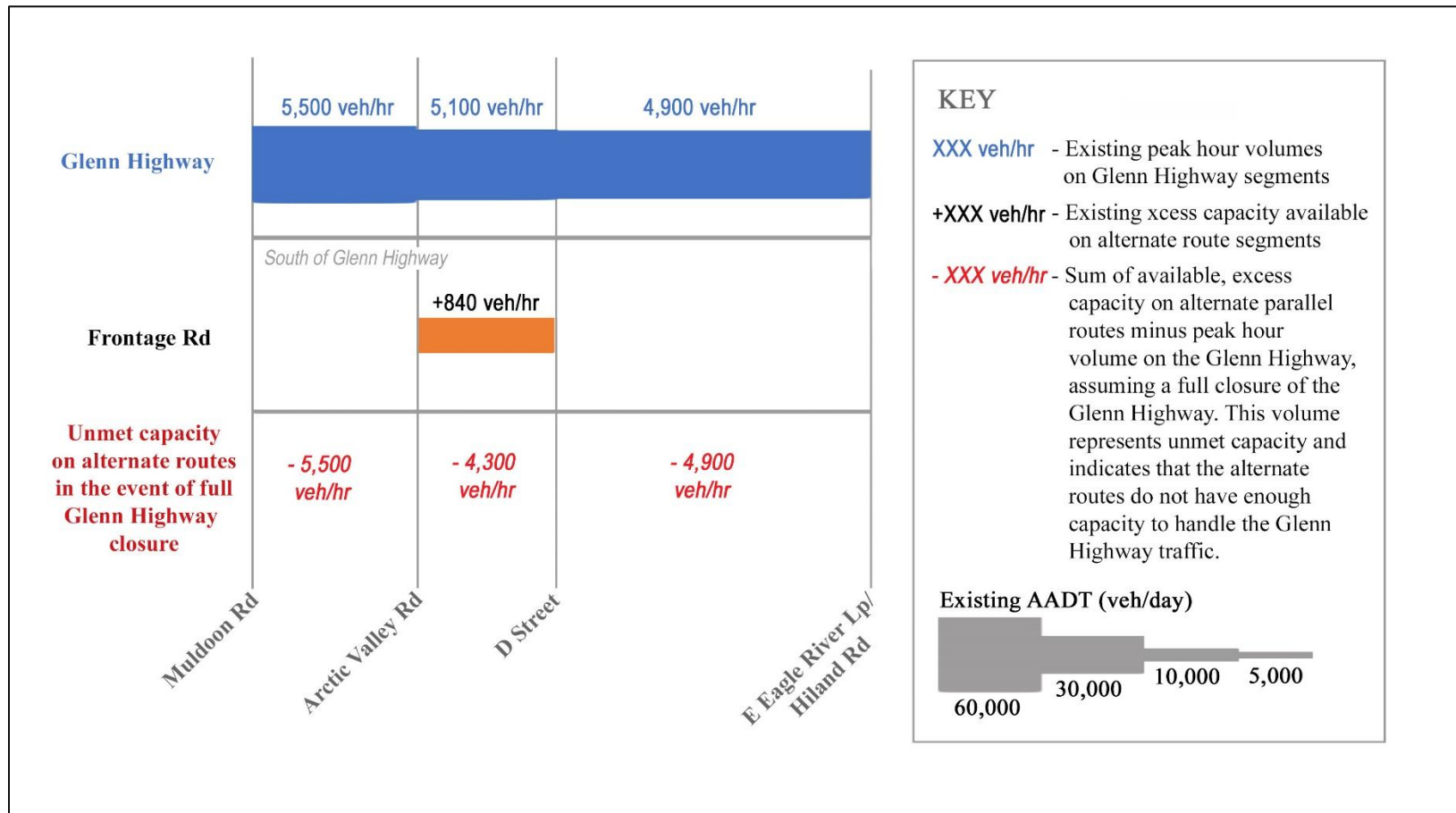


Figure 6: Available Excess Capacity on Segment 2 (MP 4 to 12), AM Peak Hour

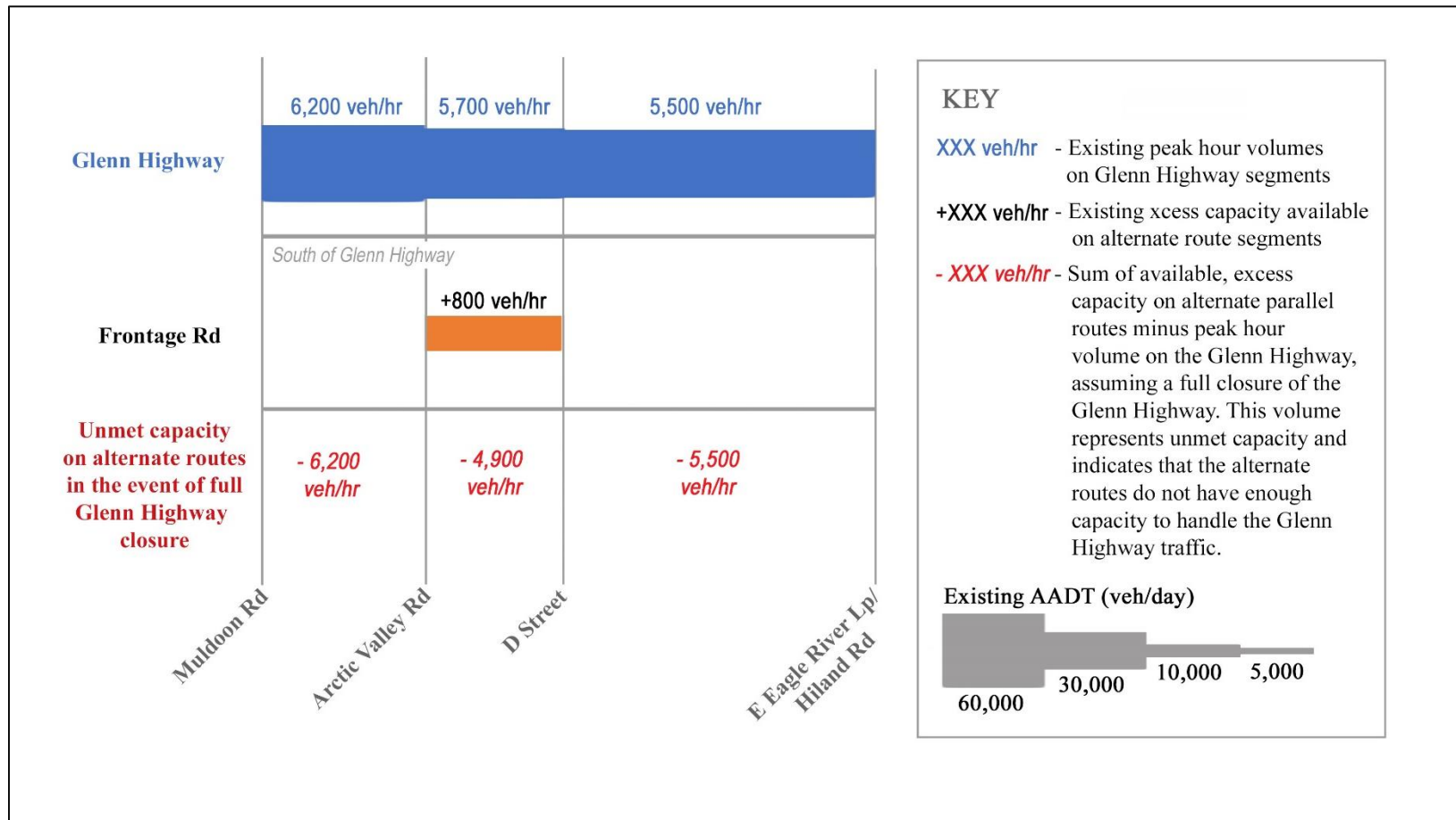


Figure 7: Excess Available Capacity on Segment 2 (MP 4 to 12), PM Peak Hour

2.3 Segment 3 – Eagle River Loop/Hiland Road to South Birchwood Loop (MP 12 to 16)

This segment of the corridor runs mostly north-south past Eagle River. West of the Glenn Highway, there is little development and no parallel routes. East of the Glenn Highway, the arterial system for Eagle River is available to accommodate diverted traffic. Figure 8 shows the network grid in this segment of the corridor.

Figure 9 and Figure 10 show the excess network capacity analysis for this segment of the Glenn Highway in the AM and PM peak periods, respectively. Similar to within the Anchorage Bowl, while many of the alternate arterial roadways can carry significant capacity, there is significant demand on these roadways already in the peak periods. Thus, only about ¼ of the Glenn Highway traffic can be diverted through this network.

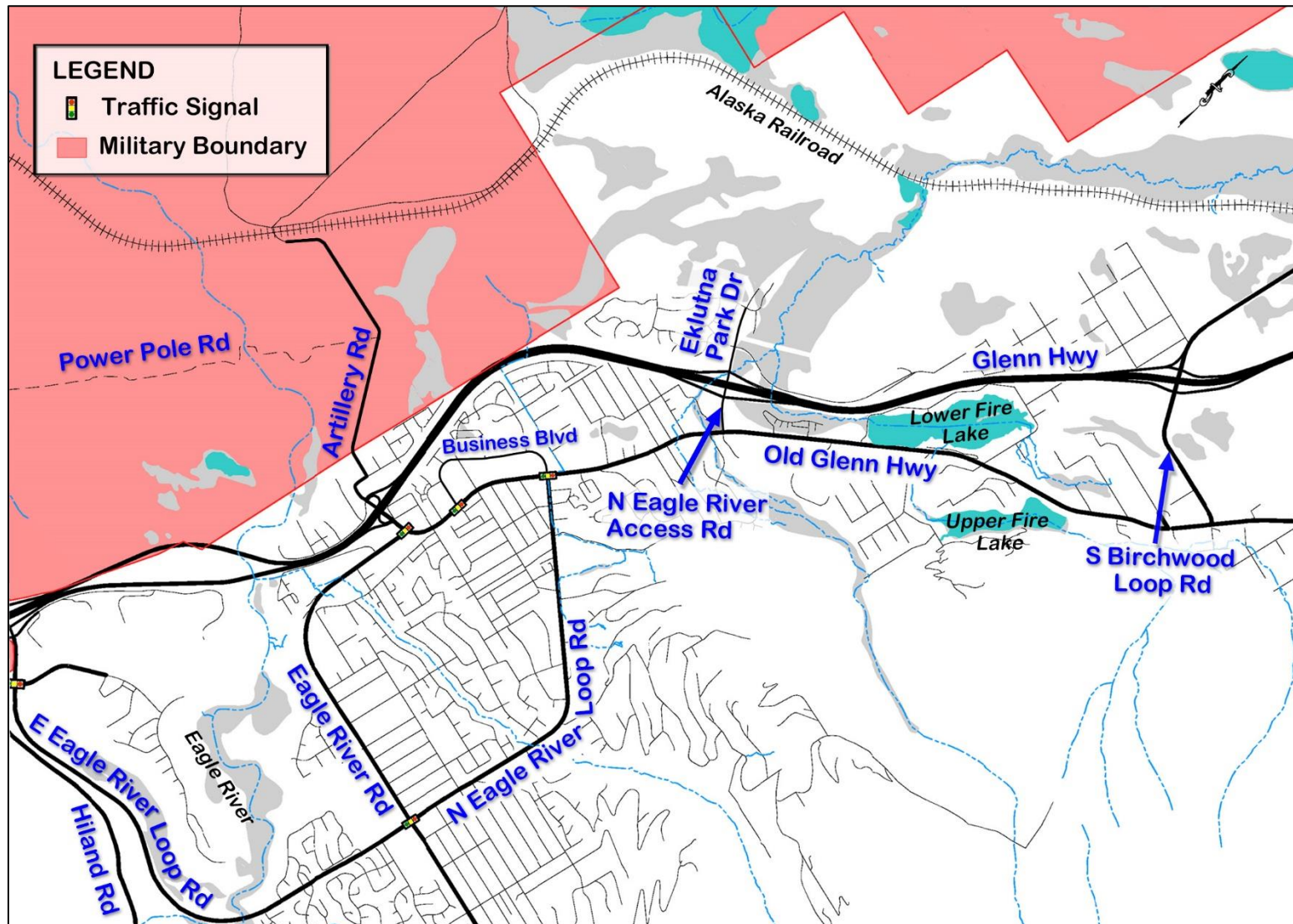


Figure 8: Eagle River Loop/Hiland Road to South Birchwood Loop (MP 12 to 16)

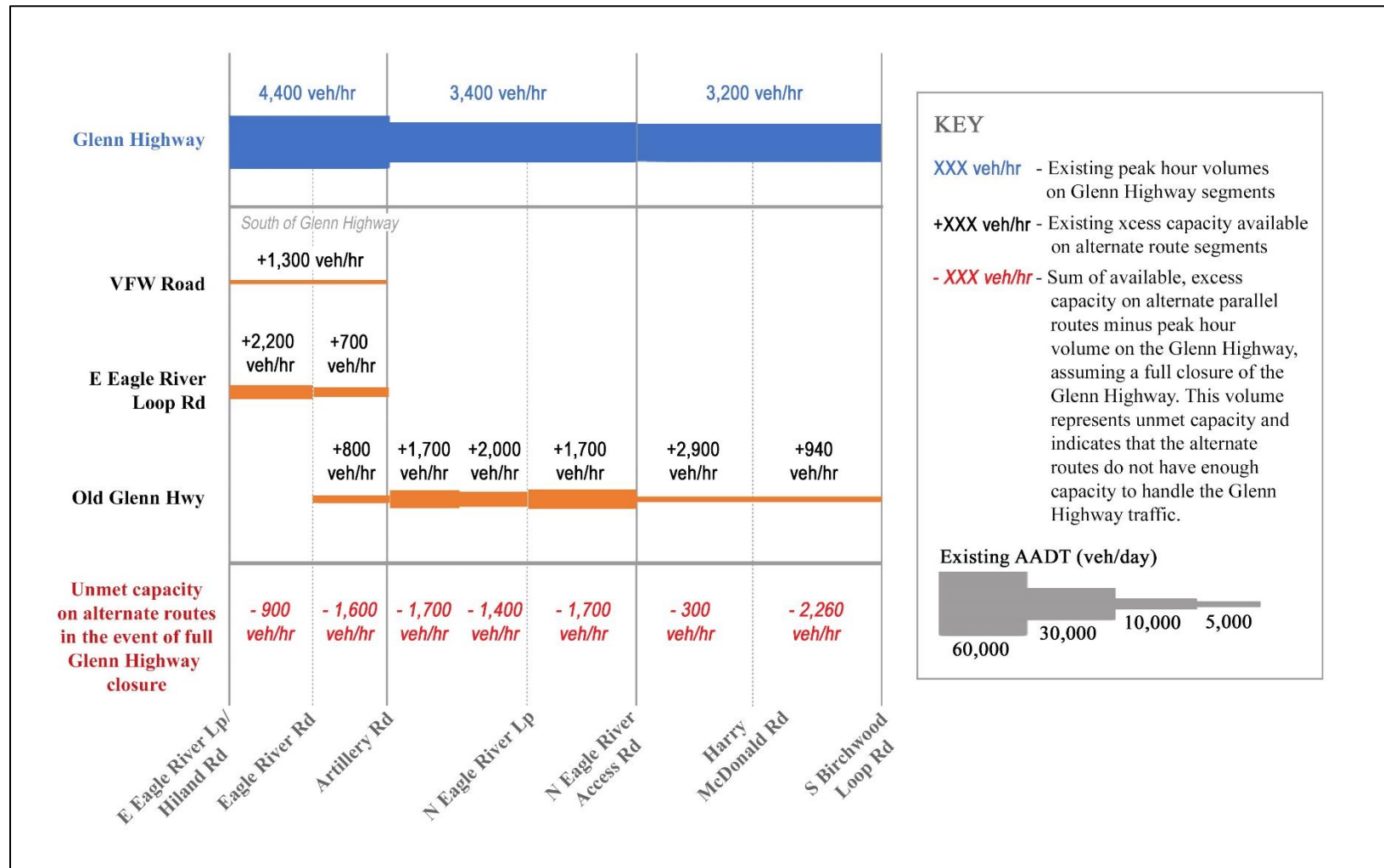


Figure 9: Available Excess Capacity on Segment 3 (MP 12 to 16), AM Peak Hour

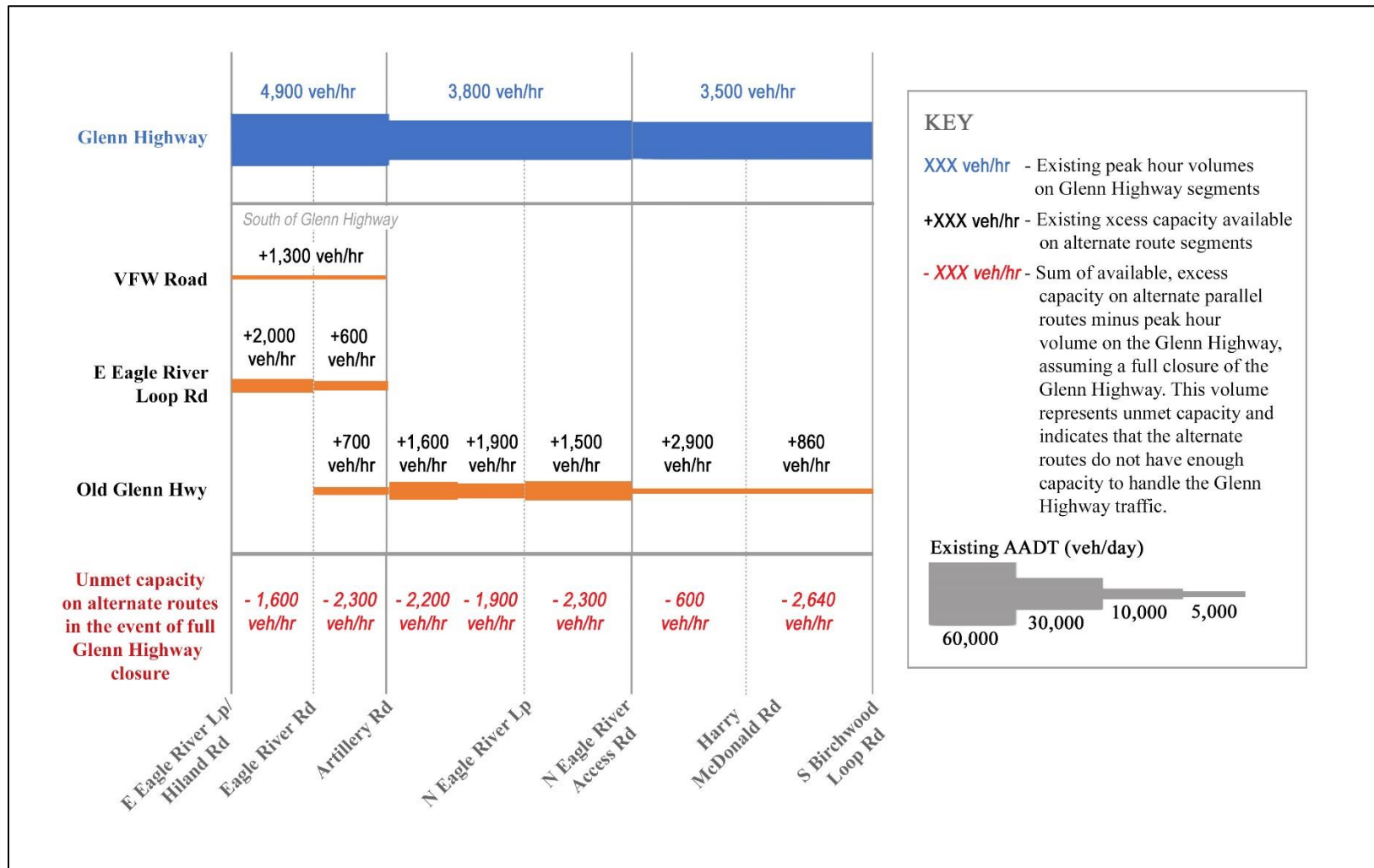


Figure 10: Available Existing Capacity on Segment 3 (MP 12 to 16), PM Peak Hour

2.4 Segment 4 – South Birchwood Loop to North Birchwood Loop (MP 16 to 19)

This segment of the corridor runs mostly northeast-southwest through the Birchwood area. West of the Glenn Highway, Birchwood Loop Road (a major collector) connects the two interchanges, running in short segments with frequent sharp turns. East of the Glenn Highway, the Old Glenn Highway (a minor arterial) connects the two interchanges. Figure 11 shows the network grid in this segment of the corridor.

Figure 12 and Figure 13 show the excess network capacity analysis for this segment of the Glenn Highway in the AM and PM peak periods, respectively. These roads can carry about one-third of the Glenn Highway demand.

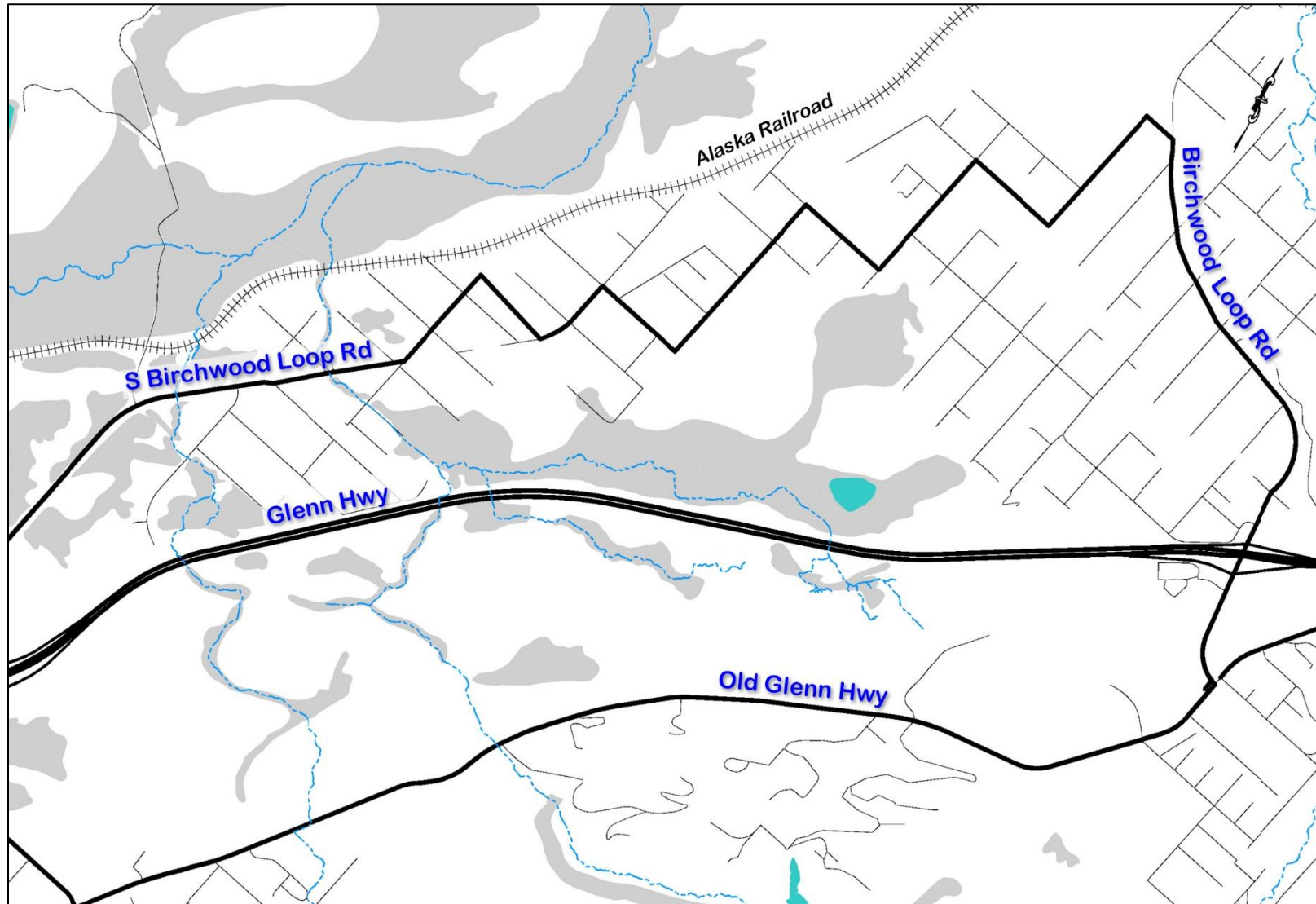


Figure 11: South Birchwood Loop to North Birchwood Loop (MP 16 to 19)

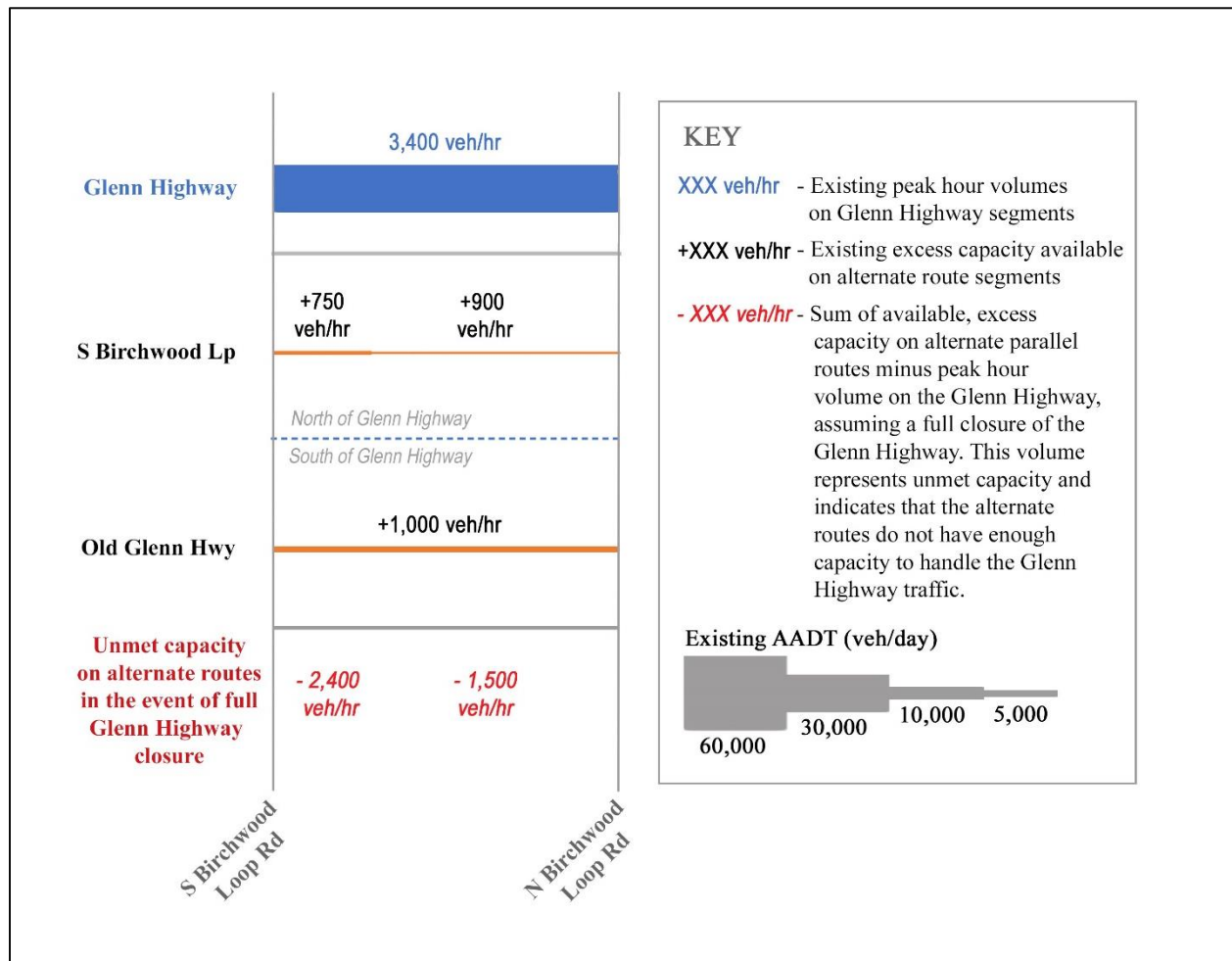


Figure 12: Available Excess Capacity on Segment 4 (MP 16 to 21), AM Peak Hour

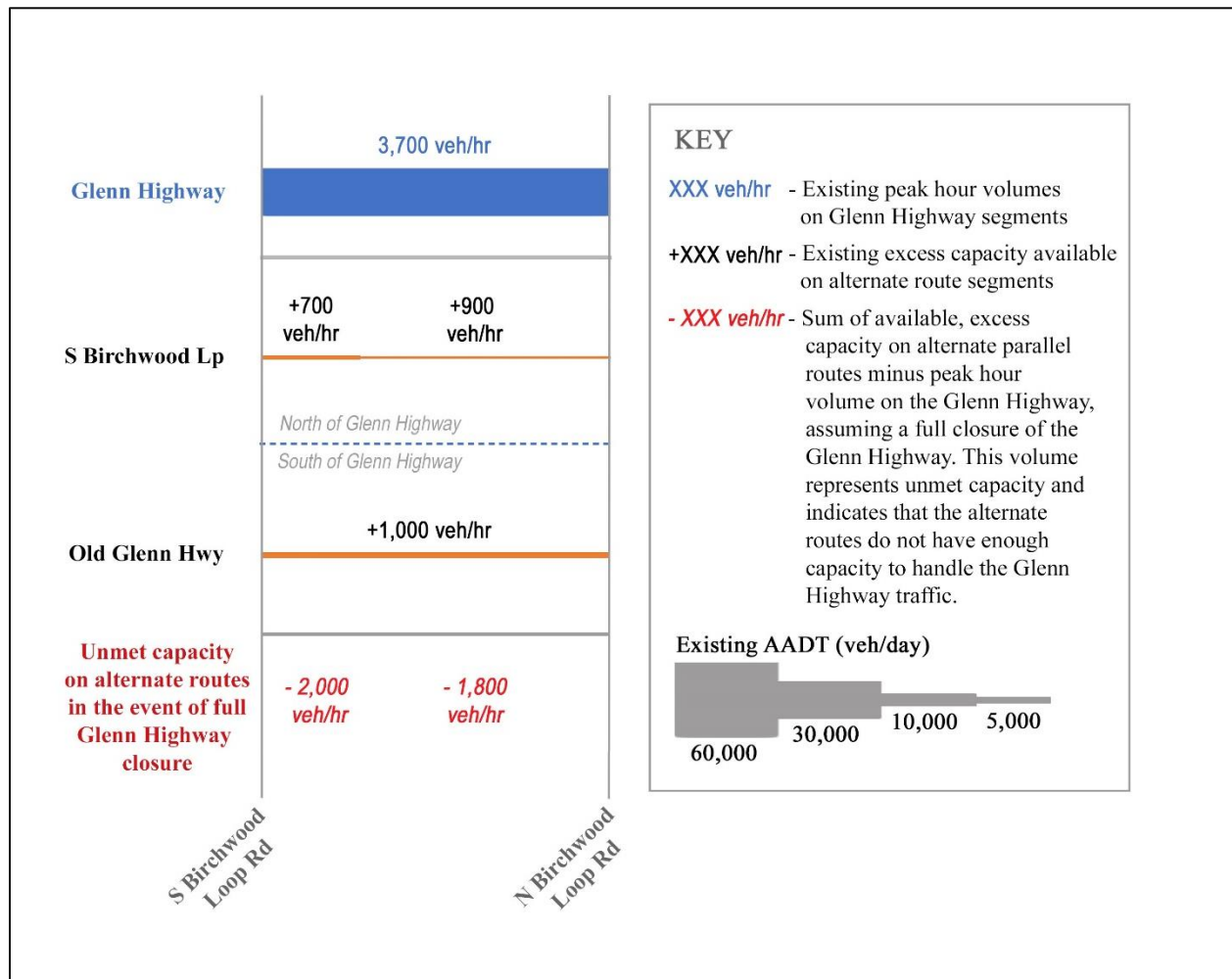


Figure 13: Available Excess Capacity on Segment 4 (MP 16 to 21), PM Peak Hour

2.5 Segment 5 – Chugiak/North Birchwood Loop to North Peters Creek (MP 19 to 23)

This segment of the corridor runs mostly northeast-southwest through the Peters Creek area. While there is development on both sides of the highway, parallel routes consist entirely of major or minor collector roadways with limited capacity. Figure 14 shows the network grid in this segment of the corridor.

Figure 15 and Figure 16 show the excess network capacity analysis for this segment of the Glenn Highway in the AM and PM peak periods, respectively. While the parallel routes in this area have limited capacity, the demand volume on the Glenn Highway is also reduced in this area, so that the parallel routes can carry about one-half of the Glenn Highway demand.

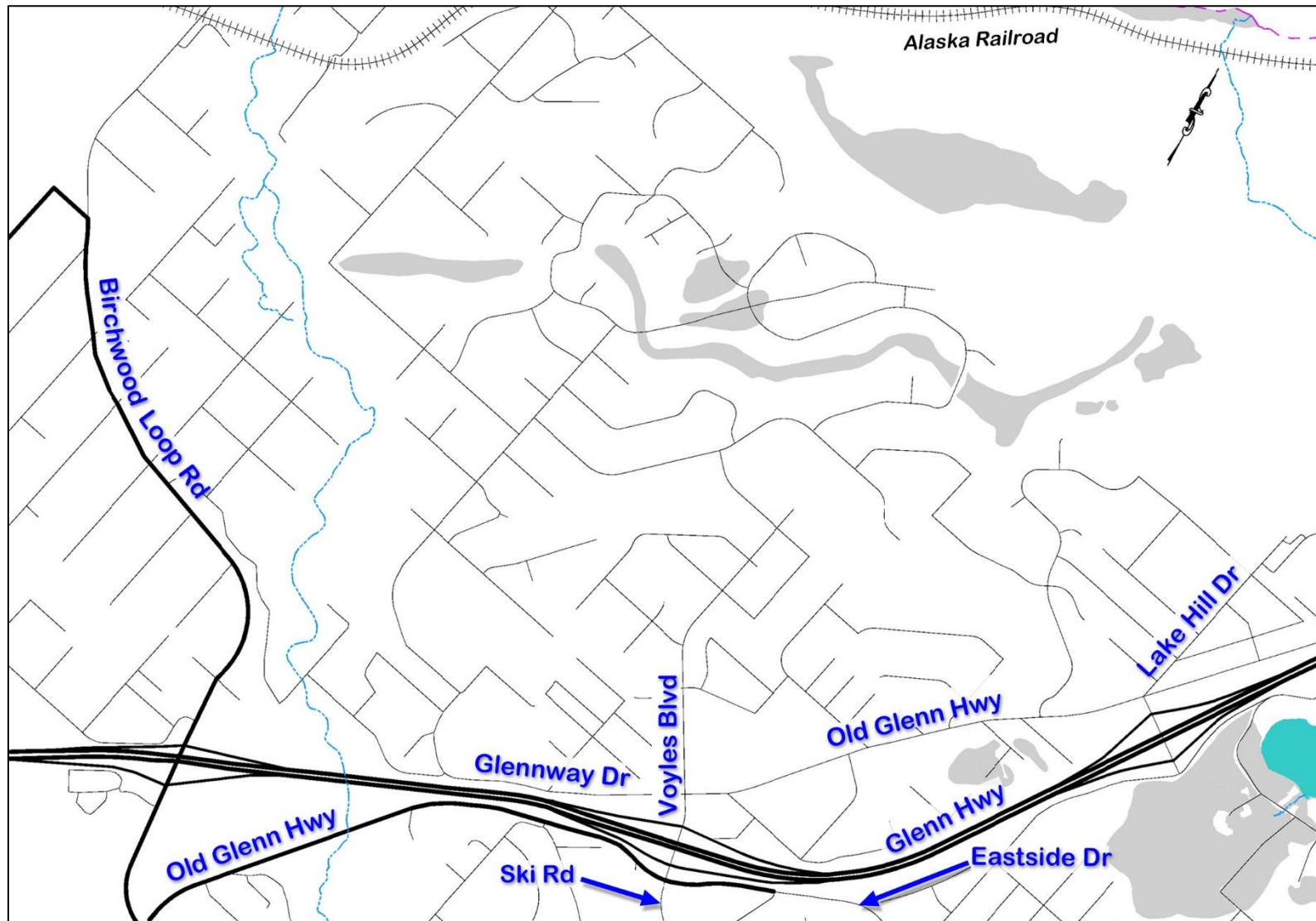


Figure 14: North Birchwood Loop to Mirror Lake (MP 19 to 23)

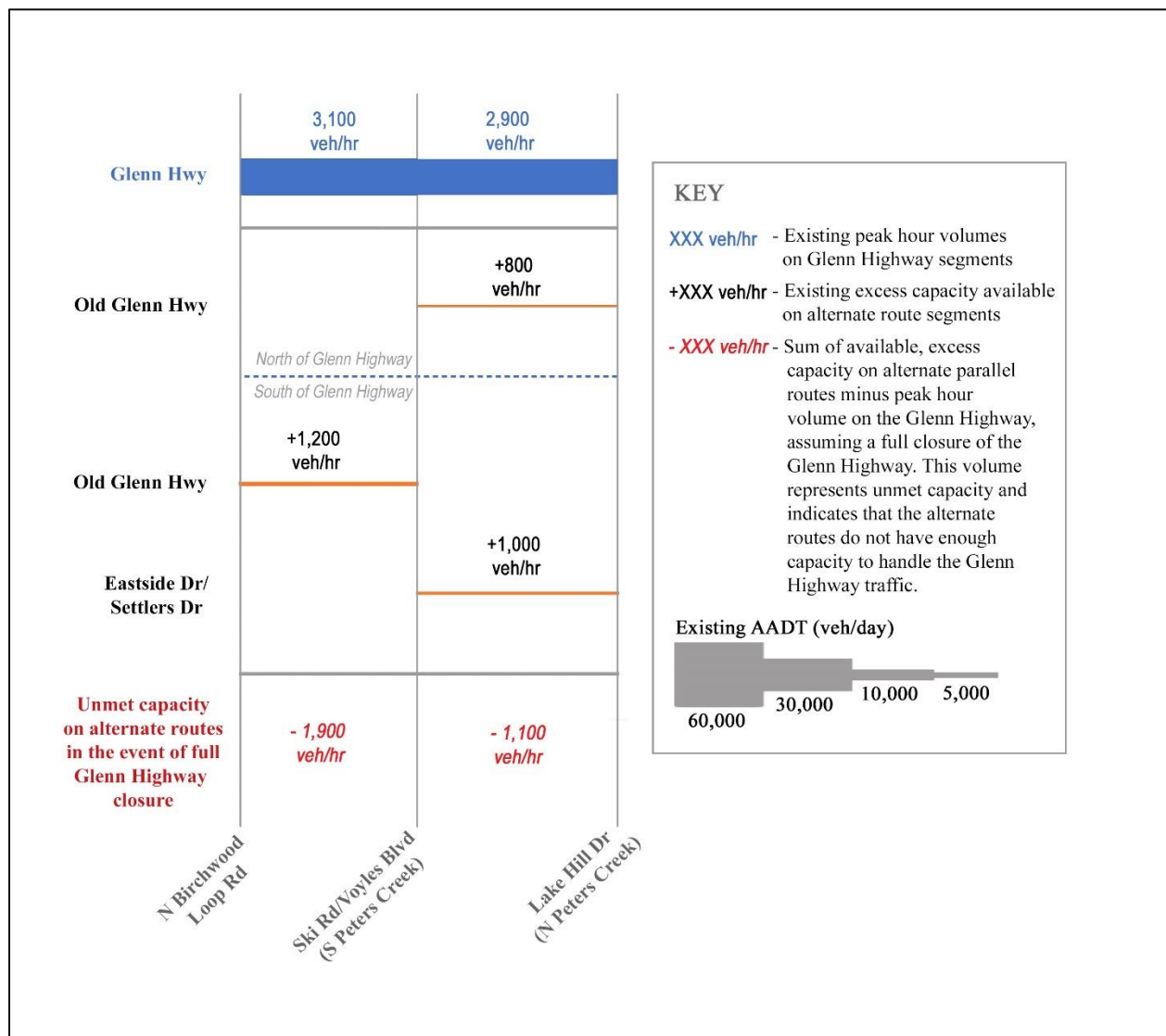


Figure 15: Available Excess Capacity on Segment 5 (MP 21 to 23), AM Peak Hour

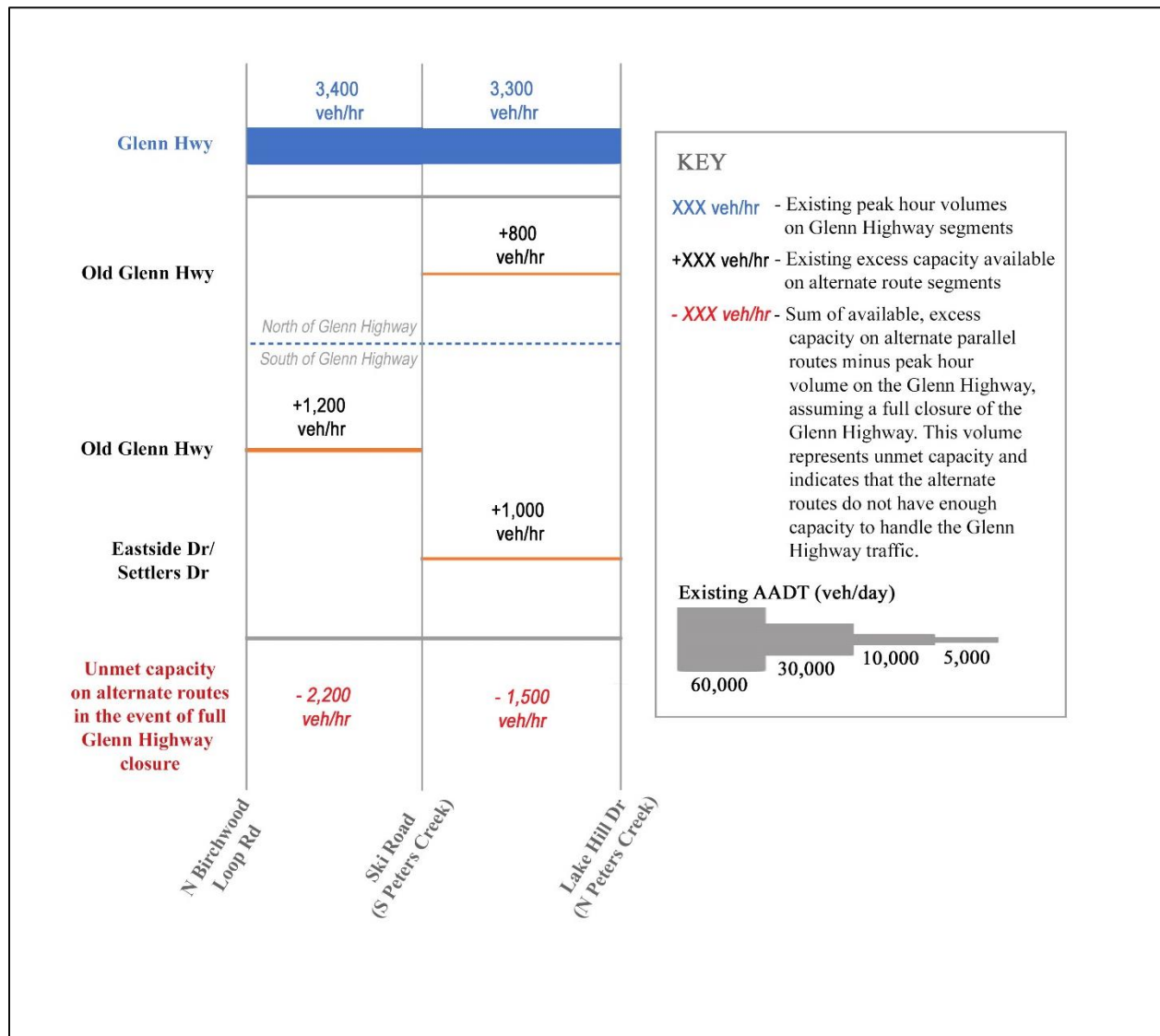


Figure 16: Available Excess Capacity on Segment 5 (MP 21 to 23), PM Peak Hour

2.6 Segment 6 – North Peters Creek to the Knik River Bridge (MP 23 to 30)

This segment of the corridor turns to run almost east-west from the Peters Creek area to the Knik River Bridge. There is limited development on either sides of the highway, and there are essentially no parallel routes. Figure 17 shows the network grid in this segment of the corridor.

There are no alternate routes available to provide excess network capacity on this segment of the Glenn Highway.

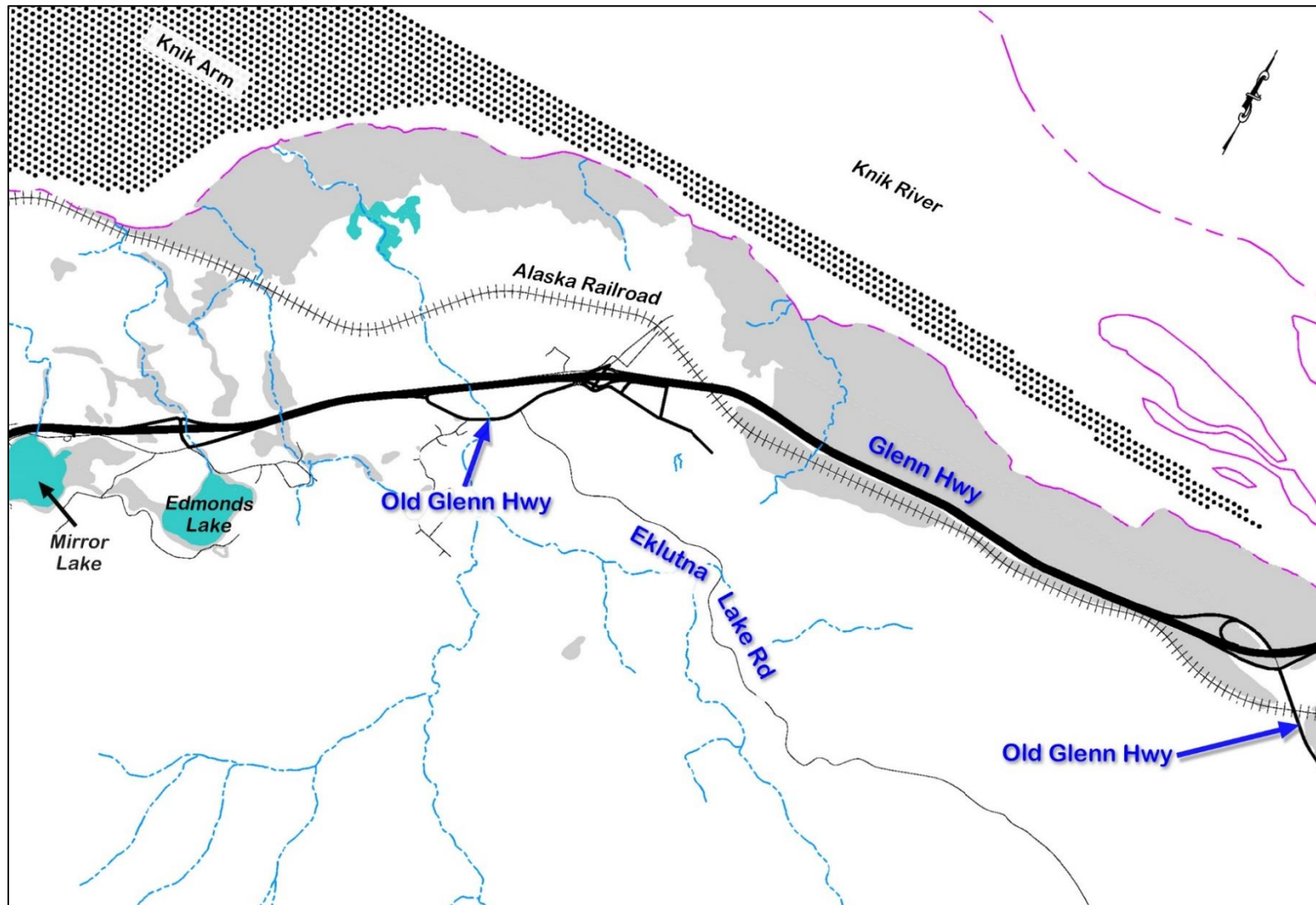


Figure 17: Mirror Lake to the Knik River Bridge (MP 23 to MP 30)